

CURRICULUM VITAE

MAKOTO (Mak) SAITO

Senior Scientist with Tenure, Stanley Watson Chair
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EDUCATION

1990 The Sidwell Friends School, Washington D.C.
1994 Oberlin College, B.A., Biology and Environmental Studies majors,
Chemistry minor (Highest Honors)
2001 MIT/WHOI Joint Program in Chemical Oceanography, Ph.D.
2003 Princeton University, Postdoctoral Fellow

PROFESSIONAL EXPERIENCE

Constructed Wetlands Project Manager - Lorain County General Health District, Ohio, 1993-1995
Research Assistant - Ohio Geological Survey, Lake Erie Division, 1994-1995
Graduate Research Assistant, Woods Hole Oceanographic Institution, 1995-2001
Harry Hess Post-Doctoral Scholar, Geosciences Department, Princeton University, 2001-2003
Assistant Scientist, Marine Chemistry and Geochemistry Department, Woods Hole Oceanographic Institution, 2003-2007
Associate Scientist, Marine Chemistry and Geochemistry Department, Woods Hole Oceanographic Institution, 2007-2011
Associate Scientist with Tenure, Marine Chemistry and Geochemistry Department, Woods Hole Oceanographic Institution, 2011-2017
Senior Scientist, Marine Chemistry and Geochemistry Department, Woods Hole Oceanographic Institution, 2017-present
Co-Principal Investigator for the Biological Chemical Oceanography Data Management Office, 2017-present.

FELLOWSHIPS AND AWARDS

1990 Thomas Sidwell Award, The Sidwell Friends School
1993 Mellon Foundation Grant for Environmental Research, Oberlin College
1993 Environmental Careers Organization (ECO) - Student Initiated Project Fellowship
1994 Mellon Foundation Grant for Environmental Research, Oberlin College
1994 Norman Wright Biology Award, Oberlin College
1994 Joyce Gorn Award in Environmental Studies, Oberlin College
1995-1996 National Science Foundation Coastal Trainee Graduate Fellowship
1998-1999 Massachusetts Institute of Technology Martin Sustainability Fellow
1996-2000 EPA STAR Graduate Fellowship
2000 Ocean Venture Fund Research Grant, WHOI
2001-2003 Hess Post-Doctoral Fellowship in Geosciences, Princeton University
2005 Office of Naval Research Young Investigator Award
2005 Ruth and Paul Fye WHOI Graduate Student Paper Award in Chemical Oceanography
2012 National Academy of Sciences Kavli Fellow
2012 Gordon and Betty Moore Foundation Marine Microbial Investigator Award

2020 Stanley Watson Senior Scientist Chair

PROFESSIONAL AFFILIATIONS

Member, American Society for Limnology and Oceanography
Member, American Geophysical Union
Member, Union of Concerned Scientists
Member, American Chemical Society
Member, American Society of Biochemistry and Molecular Biology
Member, American Society for Mass Spectrometry
Member, The Geochemical Society

RESEARCH INTERESTS

Proteomics and Marine Metaproteomics
Trace Metal Biogeochemistry of Bioactive Metals and Vitamins (Co, Fe, Cd, Zn, Mn, Ni, and B₁₂)
Trace Metal Requirements and Metalloenzyme Use in Life (Metalloomics)
Discovery of Novel Metalloenzymes in Microbes
Bioinorganic Chemistry
The Co-Evolution of Biogeochemical Cycles and Life Throughout Earth History
The Influence of Human Economies on Global and Regional Biogeochemical Cycles

PROFESSIONAL ACTIVITIES

WHOI (Non-Education Related):

Biosafety Committee, Chemistry Department representative
ICP-MS Facility Committee
75th Anniversary Committee
Ocean Microbiome Catalyst Project Participant 2016-2017
Department Faculty Search Committee 2017-2018
PI for the Biological and Chemical Data Management Office (BCO-DMO), 2017-present
Co-Chair of the Gender Equity Program Advisory Committee (2017)
Co-Chair of the Workplace Climate Committee (2018-present)
Search Committee for Human Resources Training Position Hire 2020

Outside WHOI (Other than Attendance at Society/National Meetings):

2002-2003	Participant in Diatom Genome Annotation (<i>Thalassiosira pseudonana</i>) at the Joint Genome Institute
2005	Co-Session Chair, Metal Cycling, ASLO meeting, Salt Lake City, February
2005	Co-Session Chair, Trace Element Biogeochemistry, American Chemical Society Meeting – Geosciences Division, San Diego, March 17-18
2006	Co-Session Chair, Trace Elements and Isotopes. ASLO meeting Victoria, Canada, June
2011	Co-Session Chair, Trace Metals and their Nutritional Importance to Phytoplankton and Bacteria, ASLO Aquatic Sciences Meeting, San Juan Puerto Rico
2012	Vice-Chair Bioinorganic Chemistry Gordon Research Conference
2014	Co-Session Goldschmidt: The Biogeochemical Cycling of the Nutrients N, P and Si: Terrestrial and Marine Insights for the Present, Past and Future
2011-2014	US Ocean Carbon and Biogeochemistry Scientific Steering Committee Member
2014	Session Chair, Insights from Model Systems. Marine Microbes Gordon Research Conference, Waltham MA, June 22-27, 2014

- 2014 Discussion leader Ocean Carbon and Biogeochemistry Summer Workshop. Led community discussion on Ocean Omics Data and Infrastructure Needs for OCB community, July 24, 2014
- 2014-2016 Steering committee member for Oceanography and Geobiology OMICS ECOGEO Research Coordination Network
- 2015 Co-organized GEOTRACES Biogeotraces working group meeting for incorporation of biological and biochemical parameters into 2017 GEOTRACES Intermediate Data Product
- 2016 Discussion Moderator for Micronutrients Working Group, GEOTRACES Internal Cycling Synthesis Meeting, Lamont August 2016
- 2016 ECOGEO Town Hall presenter ASLO-AGU OSM Meeting 2016
- 2016 SeaView Workshop Participant ASLO-AGU OSM Meeting 2016
- 2016 Session Chair: "Microbes" at the Copper in Biology 16 Conference
- 2015-2017 Vice-Chair for Chemical Oceanography Gordon Research Conference
- 2017-2019 Chair for Chemical Oceanography Gordon Research Conference
- 2017-present Lead and Science PI for Biological Chemical Data Management Office (BCO-DMO)
- 2021-present Knowledge Transfer Coordinator – Center for Chemical Currencies of a Microbial Planet (C-CoMP)
- 2021 OCB Ocean Metaproteomics Intercomparison Workshop. Convener with Matthew McIlvin. September 16-17th 2021.

Editorial and Reviewing Activities

- 2013 – present Advisory Board Member – Metallomics Journal
- 2014 – present Editorial Board – Environmental Microbiology Reports
- 2007 – 2021 Associate Editor – Marine Chemistry
- 2010 – 2021 Review Editor – Frontiers in Aquatic Microbiology
- 2011 – 2021 Editorial Board – Frontiers in Microbiological Chemistry
- Manuscript reviewer for Aquatic Microbial Ecology, Aquatic Sciences, Aquatic Toxicology, Astrobiology, Biogeosciences, Biotechnology Progress, Deep-Sea Research, Earth Atmospheric Planetary Science Letters, Ecology, Ecology Letters, Environmental Microbiology, Environmental Microbiology Reports, Environmental Science and Technology, Estuarine, Coastal and Shelf Science, Frontiers in Aquatic Microbiology, Frontiers in Microbiological Chemistry, Geobiology, Geochemical Transactions, Journal of Geophysical Research – Oceans, Limnology and Oceanography, Limnology and Oceanography Methods, Marine Chemistry, Marine Ecology Progress Series, Nature, Nature Biotechnology, Nature Geosciences, Plant Cell & Environment, Plos One, Proceedings of the Royal Society B, Proceedings National Academy of Science USA, Science
- Proposal reviewer for National Science Foundation, NASA, NSERC, Hudson River Foundation, Deutsche Forschungsgemeinschaft (DFG), United States-Israel Binational Science Foundation, Academia Sinica Taiwan, Netherlands Organization for Scientific Research, CRNS
- Panel member for National Science Foundation (Chemical Oceanography and Polar Programs)
- Panel member for NASA Astrobiology Program

PARTICIPATION IN EDUCATION

Advising Overview: Student and Post-Doc Advising: advised or advising 9 Ph.D. students, 3 Masters students, 10 Post-doctorates, and 8 summer undergraduates students

Graduate Advising:

Anne Thompson - MIT-WHOI Doctorate student, 2004-2009, co-advised with Chisholm

Whitney Krey - MIT-WHOI Masters student, 2005-2008, co-advised with Webb and DeLong
Alysia Cox - MIT-WHOI Doctorate graduate student, 2005-2011
Erin Bertrand - MIT-WHOI Doctorate student 2006-2012
Abigail Noble - MIT-WHOI Doctorate student 2006-2012
Tyler Goepfert - MIT-WHOI Masters Student 2010-2013
Daniel Tabersky - University of Duisberg-Essen Masters Student 2010
Carly Buchwald - MIT-WHOI Doctorate student 2011-2012 (primary advisor K. Casciotti)
Nick Hawco - MIT-WHOI Doctorate Student 2011-2017
Noelle Held - MIT-WHOI Doctorate Student 2014-2019
Marissa Kellogg - MIT-WHOI Doctorate Student 2017-present
Rebecca Chmiel - MIT-WHOI Doctorate Student 2017-present
Annaliese Meyer - MIT-WHOI Doctorate Student 2017-present

Post-Doctorates:

Chad Hammerschmidt, Postdoctoral Scholar, 2005-2007
Katherine Mackey, Postdoctoral Scholar, 2011-2014
Sara Bender, Postdoctoral Scholar, 2013-2015
Tristan Horner, Postdoctoral Scholar, 2014-2015
Julia Gauglitz, Postdoctoral Scholar, 2014-2017
Randelle Bundy Postdoctoral Scholar, 2014-2017, co-advised with Dan Repeta
Veronique Oldham Postdoctoral Scholar, 2017-2019, co-advised with Colleen Hansel
Natalie Cohen, Simons Postdoctoral Scholar, 2017-2020
Michael Mazzotta, Drefyus Environmental Chemistry Scholar, 2018-2020
Jaci Saunders, NASA/GMBF Postdoctoral Scholar/Investigator, 2017-present
Margaret Mars Brisbin WHOI Postdoctoral Scholar, 2021- present

Undergraduate Advising - WHOI Summer Student Fellows, PEP Fellows and Guest Students:

Erin Bertrand (Bates College, 2005)
Alexandra Borst (Pomona College, 2004)
Allison St. Vincent (MIT, 2009)
Sarah Choyke (Haverford, 2009)
Emily Lorch (Plymouth UK, 2009, 2010)
Noelle Held (Stetson University, 2013)
Marissa Kellogg (Boston College, 2015, 2016)
Luis Valentin (U. Puerto Rico, 2016)

Thesis Committee and Defense Chairs:

Committee Member for Rachel Wisniewski (Moffett student), Madeli Castruita (Stiefel and Morel Student), Seth John (Boyle student), Jake Waldbauer (Chisholm Student), Yanmei Shi (DeLong Student), Laure-Anne Ventouras (DeLong Student), Daniel Ohnemus (Lam Student), Carly Buchwald (Casciotti Student), Rene Boiteau (Repeta Student), Bethanie Edwards (Van Mooy Student), Keisuke Inomura (Follows Student), David Shire (Rutgers, Kustka Student), Jennifer Kenyon (Buessler Student), Deepa Rao (Follows Student), Tianyi Huang (Boyle Student), Donald Martocello (Wankel Student).

Chaired Thesis Proposal Defense of Kathleen Munson, December 13th 2013 (Lamborg Student)
Chaired Doctoral Thesis of Virginia Rich (Ed DeLong Student, June 2008)
Chaired Doctoral Thesis of Li Li (U. Mass Boston, April 29th 2009, Gordon Wallace Advisor)

Chaired Thesis Proposal Defense for Gabriela Farfan (2015)
External Examiner for Gabriel Dulaquais (University of Brest 2015)
External Examiner for David Jansen (U. Victoria 2017)
Chaired Doctoral Thesis of Winn Johnson (2017)
External Examiner for Margaret Mars Brisbin, Okinawa Institute Science and Technology (2020)
External Examiner for Indrani Sarker, Macquarie University Australia (2020)

Teaching

2008-present Marine Bioinorganic Chemistry, MIT-WHOI Graduate Course 12.741 (Offered in alternate years)
Guest Lecturer for Microbial Diversity Course at MBL on Proteomics and Metal Nutrition 2014, 2015, 2016, 2017
Guest Lecturer for Microbial Biogeochemistry (2015, 2017, 2019)
Guest Lecturer at Sea Education Association, Antarctic Science, March 11, 2015
Teaching assistant for graduate level class Aquatic Chemistry, MIT (1996)

Education Administration

Joint Committee for Chemical Oceanography (JCCO) for the MIT-WHOI Joint Program, 2013-present
WHOI Chemical Oceanography General Exam Co-Coordinator (2005, 2011)
First-year Chemical Oceanography Graduate Student Advising Committee (2003-2004, 2010-2011)
Pre-selection Committee for WHOI Dean search (2016)
WHOI Dean and VP Search Committee (2017)

SUPERVISION AT WHOI

Technical Staff:

Dawn Moran, Research Associate II, 2007-present
Dr. Matt McIlvin, Research Associate III, 2010-present
Laura Rea, Research Assistant I, 2017-2018
Luis Valentin, Research Assistant I, 2016-2018
Marissa Kellogg, Research Assistant I, 2016-2017
Meghan Jelloe, Research Assistant I (part-time), 2014-2015
Dr. Vladimir Bulygin, Research Associate II, 2007-2009
Abigail Noble, Research Assistant II, 2004-2006
Erin Bertrand, Research Assistant II, 2005-2006
Tyler Goepfert, Research Assistant II, 2004-2005; Research Assistant III, 2005-2008

CRUISE PARTICIPATION AND FIELD WORK

1995 June	R/V <i>Westward</i> , Coastal Atlantic
1996 June	R/V <i>Oceanus</i> , Sargasso Sea
1997 March	R/V <i>Oceanus</i> , Sargasso Sea
1998 February	R/V <i>Oceanus</i> , Sargasso Sea
1998 August	R/V <i>Oceanus</i> , Sargasso Sea
1999 September	R/V <i>Oceanus</i> , Sargasso Sea
2000 August-October	R/V <i>Melville</i> , San Diego CA to Arica, Chile

2003 June-July	R/V <i>Kilo Moana</i> , Seattle to Dutch Harbor, Alaska
2004 February	R/V <i>Kilo Moana</i> , Central Pacific - <i>Chief Scientist</i>
2005 January	R/V <i>Wecoma</i> , Hawaiian Islands, E-Flux program
2005 July-August	R/V <i>Knorr</i> , Panama to Galapagos - <i>Chief Scientist</i>
2005/2006 December-January	R/V <i>N.B. Palmer</i> , Ross Sea, Antarctica
2006 June	R/V <i>Seward Johnson</i> , Equatorial Atlantic
2006 November-December	R/V <i>N.B. Palmer</i> , Ross Sea, Antarctica
2007 November-December	R/V <i>Knorr</i> , South Atlantic - <i>Chief Scientist</i>
2009 January-February	McMurdo Sound, Antarctica - <i>Expedition leader</i>
2009 November-December	McMurdo Sound, Antarctica - <i>Expedition leader</i>
2011 October 1-26, 2012	R/V <i>Kilo Moana</i> , Central Pacific - <i>Co-Chief Scientist with Carl Lamborg</i>
2015 January 30-February 4 th	R/V <i>Atlantic Explorer</i> , Bermuda Atlantic Time Series
2016 January 15-February 12 th	R/V <i>Falkor</i> , Hawaii to Tahiti - <i>Chief Scientist</i>
2017 July 5-9 th	R/V <i>Armstrong</i> , AUV Clio Engineering Trials, Woods Hole to Woods Hole.
2017-2018 Dec 16 th – Jan 20 th	R/V <i>N.B. Palmer</i> Punta Arenas to McMurdo Station, Antarctica
2018 April 12 th -15 th	R/V <i>Atlantic Explorer</i> , BATS - AUV Clio Deployment
2018 June 13 th -16 th	R/V <i>Atlantic Explorer</i> , BATS - AUV Clio Deployment
2018 October 20 th -24 th	R/V <i>Atlantic Explorer</i> , BATS - AUV Clio Deployment
2019 April 20 th -24 th	R/V <i>Atlantic Explorer</i> , BATS - AUV Clio Deployment
2019 June 16-28 th	R/V <i>Atlantic Explorer</i> , Bermuda - Woods Hole w/Clio – <i>Chief Scientist</i>

PATENTS

Cobalamin Acquisition Protein and Use Thereof. U.S. Patent No. 9,234,012 Mak Saito and Erin Bertrand.

Compositions and Methods for Absolute Quantification of Proteins. US Provisional Patent 62/242,137. Mak Saito and Matthew McIlvin.

SOFTWARE

METATRYP – Python Libraries for in silico analysis of shared tryptic peptides across microbial genomes.

Alex Dorsk and Mak Saito <https://github.com/saitomics/metatryp>

METATRYP Version 2.0 Jaci Saunders, David Gaylord <https://github.com/WHOIGit/metatryp-2.0>

Informatics Websites for Proteomics Datasets

<http://Metatryp.who.edu> Launched at Ocean Sciences February 2018

<https://metatryp-coronavirus.who.edu/> Corona virus instance of METATRYP

<http://Oceanproteinportal.org> Launched summer of 2018 at ASMS, SciPy, and EarthCube

PAPERS IN REFEREED JOURNALS (*Ph.D. Advisee, *Post-Doc Advisees)

1. Walworth[#], N.G., Saito, M.A.[#], Lee, M.D., McIlvin, M.R., Moran, D.M., Kellogg*, R.M., Fu, F.X. and Hutchins, D.A., 2021. Why Environmental Biomarkers Work: Transcriptome-Proteome Correlations and Modeling of Multi-Stressor Experiments in the Marine Bacterium *Trichodesmium*. # co-first authors. In Press at Journal of Proteome Research.
2. Zhou Liang, Kelly McCabe, Sarah E. Fawcett, Heather J. Forrer, Catherine Jeandel, Dario Marconi, Hélène Planquette, Mak A. Saito, Jill A. Sohm, Rachel K. Thomas, Eric A. Webb, Robert T. Letscher, Angela N. Knapp A global ocean dissolved organic phosphorus (DOP) concentration database (DOPv2021). Submitted.
3. Noelle A. Held*, John B. Waterbury, Eric A. Webb, Riss M. Kellogg*, Matthew R. McIlvin, Michael Jakuba, Frederica W. Valois, Dawn M. Moran, Kevin M. Sutherland, Mak A. Saito. Dynamic diel

proteome and daytime nitrogenase activity supports buoyancy in *Trichodesmium erythraeum*. In press at Nature Microbiology.

4. Kellogg*, Riss M., Dawn M. Moran, Matthew R. McIlvin, Adam Subhas, Andrew Allen, Mak A. Saito. Lack of a Zn/Co substitution ability in the polar diatom *Chaetoceros* RS19. In revision at Limnol. Oceanogr.
5. Kellogg* Riss M., Mark A. Moosburner, Natalie R. Cohen[†], Nicholas J. Hawco*, Matthew R. McIlvin, Dawn M. Moran, Andrew E. Allen, Mak A. Saito. Two zinc and cobalt-responsive proteins in marine eukaryotic phytoplankton and implications for Zn scarcity in the surface oceans. Submitted.
6. McIlvin, M.R. and Saito, M.A., 2021. Online Nanoflow Two-Dimension Comprehensive Active Modulation Reversed Phase–Reversed Phase Liquid Chromatography High-Resolution Mass Spectrometry for Metaproteomics of Environmental and Microbiome Samples. *Journal of Proteome Research*.
7. Tanya Marshall, Julie Granger, Karen L. Casciotti, Kirstin Dähnke, Kay-Christian Emeis, Dario Marconi, Matthew R. McIlvin, Abigail E. Noble, Mak A. Saito, Daniel M. Sigman, and Sarah E. Fawcett. Sedimentary iron and excess phosphate jointly regulate N₂ fixation in the South Atlantic. Submitted.
8. Mazzotta[†] Michael G, Matthew R. McIlvin, Dawn M. Moran, David T. Wang, Kay D. Bidle, Carl H. Lamborg, Mak A. Saito. 2021. Characterization of the metalloproteome of *Pseudalteromonas* (BB2-AT2): biogeochemical underpinnings for zinc, manganese, cobalt and nickel cycling in a ubiquitous marine heterotroph. In press at Metallomics.
9. Cohen, N.R., Noble, A.E., Moran, D.M., McIlvin, M.R., Goepfert, T.J., Hawco, N.J., German, C.R., Horner, T.J., Lamborg, C.H., McCrow, J.P. and Allen, A.E., 2021. Hydrothermal trace metal release and microbial metabolism in the Northeast Lau Basin of the south Pacific Ocean. *Biogeosciences*. 1-39.
10. Oldham, V.E., Chmiel, R., Hansel, C.M., DiTullio, G.R., Rao, D. and Saito, M., 2021. Inhibited manganese oxide formation hinders cobalt scavenging in the Ross Sea. *Global Biogeochemical Cycles*, 35(5), p.e2020GB006706.
11. Bianchi, T.S., Anand, M., Bauch, C.T., Canfield, D.E., De Meester, L., Fennel, K., Groffman, P.M., Pace, M.L., Saito, M. and Simpson, M.J., 2021. Ideas and perspectives: Biogeochemistry—some key foci for the future. *Biogeosciences*, 18(10). 3005-3013.
12. Held, N.A., Sutherland, K.M., Webb, E.A., McIlvin, M.R., Cohen, N.R., Devaux, A.J., Hutchins, D.A., Waterbury, J.B., Hansel, C.M. and Saito, M.A., 2021. Mechanisms and heterogeneity of in situ mineral processing by the marine nitrogen fixer *Trichodesmium* revealed by single-colony metaproteomics. *ISME Communications*, 1(1), pp.1-9.
13. Natalie R. Cohen[†], Matthew R. McIlvin, Dawn M. Moran, Noelle A. Held^{*}, Jaclyn K. Saunders[†], Nicholas J. Hawco, Michael Brosnahan, Giacomo R. DiTullio, Carl Lamborg, John P. McCrow, Chris L. Dupont, Andrew E. Allen, Mak A. Saito. 2021. Dinoflagellates contribute to primary and secondary production in the central Pacific Ocean. *Nature Microbiology*.
14. M.A. Saito, Jaclyn K. Saunders[†], Michael Chagnon, David Gaylord, Adam Shepherd, Noelle A. Held^{*}, Chris Dupont, Nick Symmonds, Amber York, Matt Charron, Danie Kinkade. 2021. Development of an Ocean Protein Portal for Interactive Discovery and Education. *J. Proteome Research*. 20, 326-336.
15. Julia M. Gauglitz[†], Rene M. Boiteau, Craig McLean, Lydia Babcock-Adams, Matthew R. McIlvin, Dawn M. Moran, Daniel J. Repeta, Mak A. Saito. 2021. Dynamic proteome response of a marine *Vibrio* to a gradient of iron and ferrioxamine bioavailability. *Marine Chemistry*. 229.
16. Barbara Bayer, Mak A. Saito, Matthew R. McIlvin, Sebastian Lücker, Dawn M. Moran, Thomas S. Lankiewicz, Christopher L. Dupont, and Alyson E. Santoro. 2020. Metabolic versatility of the nitrite-oxidizing bacterium *Nitrospira marina* and its proteomic response to oxygen-limited conditions. *ISME*.

17. Breier, John C., Michael V. Jakuba, Mak A. Saito, Gregory J. Dick, Sharon L. Grim, Eric W. Chan, Matthew R. McIlvin, Dawn M. Moran, Brianna A. Alanis, Andrew E. Allen, Chris L. Dupont, Rod Johnson. 2020. Robotic oceanography: Revealing ocean-scale biochemical structure with a deep-diving autonomous vehicle. *Science Robotics*.
18. Saunders[†], Jaclyn K., David Gaylord, Noelle Held^{*}, Nick Symmonds, Chris Dupont, Adam Shepherd, Danie Kinkade, Mak A. Saito. 2020. METATryp v 2.0: Metaproteomic Least Common Ancestor Analysis for Taxonomic Inference Using Specialized Sequence Assemblies - Standalone Software and Web Servers for Marine Microorganisms and Coronaviruses. *J. Proteome Research*. 19, 4718-4729.
19. Mazzotta[†] M, McIlvin MR, Saito MA. Characterization of the Fe Metalloproteome of a Ubiquitous Marine Heterotroph, *Pseudoalteromonas* (BB2-AT2): Multiple Bacterioferritin Copies Enable Significant Fe Storage. *Metallomics*. 12, 654-667. DOI: [10.1039/D0MT00034E](https://doi.org/10.1039/D0MT00034E)
20. Mak A. Saito, Matthew R. McIlvin, Dawn M. Moran, Alyson E. Santoro, Chris L. Dupont, Patrick Rafter, Jaclyn Saunders[†], Drishti Kaul, Carl H. Lamborg, Marian Westley, Frederica Valois, John B. Waterbury. 2020. Abundant nitrite-oxidizing metalloenzymes in the mesopelagic zone of the tropical Pacific Ocean. *Nature Geosciences*, 13(5). 355-362. <https://doi.org/10.1038/s41561-020-0565-6>.
21. Nicholas J. Hawco^{*}, Matthew M. McIlvin, Randelle M. Bundy[†], Alessandro Tagliabue, Tyler J. Goepfert^{*}, Dawn M. Moran, Luis Valentin-Alvarado, Giacomo R. DiTullio, and Mak A. Saito. 2020. Minimal cobalt metabolism in the marine cyanobacterium *Prochlorococcus*. *Proc. Natl. Acad. Sci.* 117(27). 15740-15747. <https://doi.org/10.1073/pnas.2001393117>
22. Bundy[†], R. M., Tagliabue, A., Hawco, N. J., Morton, P. L., Twining, B. S., Hatta, M., Noble, A., Cape, M. R., John, S. G., Cullen, J. T., and Saito, M. A. 2020. Elevated sources of cobalt in the Arctic Ocean. *Biogeosciences*. <https://doi.org/10.5194/bg-2020-84>.
23. Morel, F.M., Lam, P.J. and Saito, M.A., 2020. Trace Metal Substitution in Marine Phytoplankton. *Annual Review of Earth and Planetary Sciences*, 48:491-517. <https://www.annualreviews.org/doi/10.1146/annurev-earth-053018-060108>
24. Marissa Kellogg^{*}, Matthew R. McIlvin, Jagruti Vedamati, Benjamin S. Twining, James W. Moffett, Adrian Marchetti, Dawn M. Moran, Mak A. Saito. Efficient zinc/cobalt interreplacement in northeast Pacific diatoms and relationship to high surface dissolved Co:Zn ratios. 2020. *Limnol. Oceanogr.* <https://doi.org/10.1002/lno.11471>
25. Held^{*}, N.A., Webb, E.A., McIlvin, M.M., Hutchins, D.A., Cohen, N.R., Moran, D.M., Kunde, K., Lohan, M.C., Mahaffey, C.M., Woodward, E.M.S. and Saito, M.A., 2020. Co-occurrence of Fe and P stress in natural populations of the marine diazotroph *Trichodesmium*. *Biogeosciences*. 17. 2537-2551. <https://doi.org/10.5194/bg-17-2537-2020>
26. Matthew A Charette, Lauren E Kipp, Laramie T Jensen, Jessica S Dabrowski, Laura M Whitmore, Jessica N Fitzsimmons, Tatiana Williford, Adam Ulfsbo, Elizabeth Jones, Randelle M Bundy, Sebastian M Vivancos, Katharina Pahnke, Seth G John, Yang Xiang, Mariko Hatta, Mariia V Petrova, Lars-Eric Heimbürger-Boavida, Dorothea Bauch, Robert Newton, Angelica Pasqualini, Alison M Agather, Rainer MW Amon, Robert F Anderson, Per S Andersson, Ronald Benner, Katlin L Bowman, R Lawrence Edwards, Sandra Gdaniec, Loes JA Gerringa, Aridane G González, Mats Granskog, Brian Haley, Chad R Hammerschmidt, Dennis A Hansell, Paul B Henderson, David C Kadko, Karl Kaiser, Patrick Laan, Phoebe J Lam, Carl H Lamborg, Martin Levier, Xianglei Li, Andrew R Margolin, Chris Measures, Rob Middag, Frank J Millero, Willard S Moore, Ronja Paffrath, H el ene Planquette, Benjamin Rabe, Heather Reader, Robert Rember, Micha JA Rijkenberg, Matthieu Roy-Barman, Michiel Rutgers van der Loeff, Mak Saito, Ursula Schauer, Peter Schlosser, Robert M Sherrell, Alan M Shiller, Hans Slagter, Jeroen E Sonke, Colin Stedmon, Ryan J Woosley, Ole Valk, Jan van Ooijen, Ruifeng Zhang. The Transpolar Drift as a Source of Riverine and Shelf-Derived Trace Elements to the Central Arctic Ocean. *Journal of Geophysical Research: Oceans* 125, no. 5 (2020): e2019JC015920.

27. Keisuke Inomura, Curtis Deutsch, Samuel T. Wilson, Takako Masuda, Evelyn Lawrenz, 4 Bučinská Lenka, Roman Sobotka, Julia M. Gauglitz, Mak A. Saito, Ondřej Prášil and Michael J. Follows. 2019. Quantifying oxygen management and temperature-light dependencies of nitrogen fixation by *Crocospaera watsonii*. *mSphere*. DOI:10.1128/mSphere.00531-19.
28. Julia M. Diaz, Sydney Plummer, Colleen M. Hansel, Peter F. Andeer, Mak A. Saito, and Matthew R. McIlvin. 2019. NADPH-dependent extracellular superoxide production is vital to photophysiology in the marine diatom *Thalassiosira oceanica*. *Proceedings of the National Academy of Sciences*. 116(33), 16448-16453.
29. Michael D Lee, Nathan A Ahlgren, Joshua D Kling, Nathan G Walworth, Gabrielle Rocap, Mak A Saito, David A Hutchins, Eric A Webb. 2019. Marine *Synechococcus* isolates representing globally abundant genomic lineages demonstrate a unique evolutionary path of genome reduction without a decrease in GC content. *Environmental Microbiology* 21 (5), 1677-1686
30. Noelle A Held⁺, MR McIlvin, DM Moran, MT Laub, MA Saito. Unique Patterns and Biogeochemical Relevance of Two-Component Sensing in Marine Bacteria. 2019. *MSystems* 4 (1), e00317-18
31. Saito, Mak; Bertrand, Erin ; Duffy, Megan; Gaylord, David; Held, Noelle; Hervey, Judson; Hettich, Robert; Jagtap, Pratik; Janech, Michael ; Kinkade, Danie; Leary, Dagmar ; McIlvin, Matthew; Moore, Eli; Morris, Robert; Neely, Benjamin; Nunn, Brook; Saunders, Jaclyn; Shepherd, Adam; Symmonds, Nick; Walsh, David. 2019. Progress and Challenges in Ocean Metaproteomics and Proposed Best Practices for Data Sharing. *Journal of Proteome Research*. 18 (4), 1461-1476
32. Gunnar F Kwakye, Jessica A Jiménez, Morgan G Thomas, Brett A Kingsley, Matthew McIlvin, Mak A Saito, Edmund M Korley. 2019 Heterozygous huntingtin promotes cadmium neurotoxicity and neurodegeneration in striatal cells via altered metal transport and protein kinase C delta dependent oxidative stress and apoptosis signaling mechanisms. *Neurotoxicology* 70, 48-61
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OUTREACH MEDIA, WEB, PRESENTATIONS

- CORSACS Antarctica Cruises Outreach Website (Controls on Ross Sea Algal Community Structure www.whoi.edu/sites/Corsacs, with over 16,000 unique visitors)
- Oceanus Audio [Slideshow](#) on Antarctic Proteomic Research
- [Oceanus](#) Article on Hotbunking of Iron in Marine Nitrogen Fixing Cyanobacteria
- [Oceanus](#) Article on Vitamin B₁₂ Claw and Proteomics
- Oceanus Article on Lyme Disease and metalloenzymes
- Living Lab Live Radio [Interview](#), National Public Radio WCAI, June 3, 2013
- Evening Presentation for the Woods Hole Children's School of Science on Antarctica and Vitamins, July 2013

- Media interviews regarding South Atlantic Hydrothermal Iron Plume Study August 2013 ([New York Times](#) , [NBC](#), [Science Daily](#), Die Welt (Germany), Science Times, La Gran Epoca (Spain).
- Interviewed in Imagine Magazine by the Center for Talented Youth January 2015 Edition on exploring career options as a marine scientist
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- Feature blog post on [Proteomics news](#), the most popular proteomics blog
- News related to Tristan Horner’s 2015 PNAS Iron paper ([Science 2.0](#), [Hydro-International](#))
- News related to 2015 Nature manuscript on irreversible changes in phytoplankton ([USC](#), [WHOI](#), [Washington Post](#), [The Scientist](#), [Grind TV](#))
- Laboratory and dock tour for visiting Sidwell Friends High School Students, April 11, 2015
- Microbiome experiments and lecture, Ocean Science Journalism Fellows, September 2015
- News related to the environmental influence on and analytical uncertainties of ball inflation (widely [syndicated AP story](#), original blog [post](#))
- GEOTRACES [Highlight](#) on Mackey et al., PNAS manuscript
- Living Lab Radio on Science and Art aboard the R/V Falkor: <http://capeandislands.org/post/art-science-synergy-work-tropical-pacific#stream/0>
- [National Academy of Science Chemical Roundtable](#) Lecture on the Chemistry of Ocean Microbiomes, October 19, 2016, Washington DC and [Webcast](#)
- Inside Manned Systems [article](#) on AUV Clio, December 29th 2016.
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- Outreach talk. Girl Scout Troup Silver Spring Maryland. February 14th 2021.
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PUBLISHED ABSTRACTS

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Dissolved cobalt speciation along the GEOTRACES Pacific meridional transect (GP15). Rebecca Chmiel, Karen L Casciotti, Gregory A Cutter, Phoebe J Lam, Mak A Saito. Presented at Ocean Sciences, San Diego, 16-21, February 2020.

Comparison of HPLC Derived Phytoplankton Pigments from Autonomously Collected Samples and CTD Methods to Evaluate the Integration of Autonomous Vehicles as Platforms for Enhancing Ocean Time-series Programs. Claire Medley, John A Breier Jr, Michael Jakuba, Eric W Chan, Rodney J Johnson, Matthew R McIlvin, Quinn Wright Montgomery, Paloma Lopez and Mak A Saito. Presented at Ocean Sciences, San Diego, 16-21, February 2020.

OB34H-0650 Interactive Effects of Iron, Vitamin B12 and UV Light on Phytoplankton in the Amundsen Sea. Giacomo R DiTullio, Nicole Lyn Schanke, Francesco Bolinesi, Lauren Lees, Raffaella Casotti, Peter A Lee, Mak A Saito and Olga Mangoni. Presented at Ocean Sciences, San Diego, 16-21, February 2020.

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Gradients in Functional Capabilities in the Sargasso Sea as determined by Metaproteomes collected by the Biogeochemical AUV Clio. Mak A Saito, Matthew R McIlvin, Eric W Chan, Dawn M Moran, Brian Searle, Natalie Cohen, Marissa Morgan Kellogg, Rebecca Chmiel, Paloma Lopez, Fernando Pacheco, Zachary Anderson, Rodney J Johnson, Michael Jakuba and John A Breier Jr. Presented at Ocean Sciences, San Diego, 16-21, February 2020.

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Development of an Ocean Protein Portal for Exploration of Marine Metaproteomic Datasets Mak Saito ; David Gaylord ;Adam Shepherd ; Jaclyn Saunders ;Noelle Held ; Michael Chagnon ; Nick Symmonds ; Danie Kinkade ; Alex Dorsk; Matthew McIlvin. ASMS 2018 San Diego. American Society of Mass Spectrometry. San Diego, California. June 6, 2018.

Cobalt Speciation in the Amundsen and Ross Seas during Bloom Conditions
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McIlvin, Matthew, J. Dafhne Aguirre, Hillary Clark, Valeria Culotta, Mak Saito. Metallomic Analysis of Metalloproteins within the Lyme Disease Pathogen *Borrelia burgdorferi*. American Society for Mass Spectrometry June 2014 Poster

Saito, Mak, Matthew McIlvin, Dawn Moran, Tyler Goepfert, Giacomo DiTillio, Carl Lamborg. Multiple Nutrient Stresses at Intersecting Pacific Ocean Biomes Detected by Protein Biomarkers. American Society for Mass Spectrometry June 2014 Poster

Saito, M.A., M. McIlvin, D.M. Moran, C.H. Lamborg, G. DiTullio. "Detection and Distribution of Metalloenzymes in Pacific Ocean Environments". ASLO Meeting, New Orleans. February 2013. Oral Presentation.

Noble, A.E., N. Held, M.A. Saito. Probing the chemical speciation of cobalt: preservation artifacts and redox sensitive ligands. Ocean Sciences Meeting Hawaii, 2014.

Mackey, K., M. McIlvin, A. Post, M. Saito. Strain-specific response of marine synechococcus to iron limitation. Ocean Sciences Meeting Hawaii, 2014.

Hawco, N.J., M.R. McIlvin, M.A. Saito. A meridional cobalt section from the Equatorial Pacific. Ocean Sciences Meeting Hawaii, 2014.

Ahlgren, N.A., A. Noble, L. Moore, M. Saito, R. Rocap. The unique trace metal and macronutrient conditions of the Costa Rica Upwelling Dome upwelling support a distinct and dense community of Synechococcus. Ocean Sciences Meeting Hawaii, 2014.

Munson, K.M., C.H. Lamborg, G.J. Swarr, M.A. Saito. Mercury species concentrations and fluxes in the Tropical and Equatorial Central Pacific Ocean. Ocean Sciences Meeting Hawaii, 2014. Oral Presentation.

Santoro, A.E., C.L. Dupont, M.A. Saito. The genome and proteome of an ammonia-oxidizing archaeon from the open ocean. Ocean Sciences Meeting Hawaii, 2014. Oral Presentation.

Saito, M.A., M. McIlvin, D.M. Moran, C.H. Lamborg, G. DiTullio. Distribution of Metalloenzymes in Pacific Ocean Environments as Detected by Proteomic Analysis. Goldschmidt Conference, Florence Italy August 27, 2013.

Saito, Mak, Matthew McIlvin, Dawn Moran, Tyler Goepfert, Alyson Santoro, Carl Lamborg, Vlad Zabrouskov, Justin Blethrow. Discovery and Quantitation of the Marine Microbial Metaproteome in the Central Pacific Ocean. American Society of Mass Spectrometry. Minneapolis MN, June 12, 2013.

McIlvin, M., K. Waldron, D. Moran, N. Robinson, M. Saito. Metalloprotein Characterization of the Marine Cyanobacteria: Diving into Marine Microbial Metallomes and the Search for Novel Metalloproteins in the Oceans. American Society for Mass Spectrometry. Vancouver, Canada, June 2012.

Saito, M., E. Bertrand. Marine metalloprotein abundance patterns yield insight into the implications of metal scarcity for oceanic biogeochemical processes. ACS Meeting, Environmental Bioinorganic Session. San Diego, CA. March 29, 2012.

Jenkins, B.D., T.A. Rynearson, S.T. Dyhrman, M.A. Saito, P.D. Chappell, L.P. Whitney, H. Alexander, E. M. Bertrand. From Lab To Launch: Integrating Biomarkers Derived From Genomics and Proteomics Approaches Into Remote Observing Platforms. ASLO meeting Salt Lake City, February 2012.

Noble, A. E., M.A. Saito. Insight Into The Chemical Speciation Of Cobalt In The North Atlantic. ASLO meeting Salt Lake City, February 2012.

Dyhrman, S.T., L.L.;Wurch, C.J. Gobler, E. Bertrand, M. Saito. Transcriptome and Proteome Profiling Identifies Pathways of Nutrient Metabolism In *Aureococcus anophagefferens*. ASLO meeting Salt Lake City, February 2012.

Saito, M.A., E.M. Bertrand, V. Bulygin, A.D. Cox, T.J. Goepfert, D. Moran. The Potential for Colimitation of Marine Primary Productivity: Three Biochemical Definitions, Field Observations, Application of Proteomic Diagnostics, and Comments on the Future (*Invited*). AGU/ASLO Ocean Sciences Meeting Portland, February 2010.

Bertrand, E.M., V. Bulygin, M.A. Saito. Proteomics of Vitamin B₁₂ and Iron Stress and Co-stress in Marine Diatoms. AGU/ASLO Ocean Sciences Meeting Portland, February 2010.

Saito, M.A., A.E. Noble, T.J. Goepfert. Trace Element Distributions and Phytoplankton Colimitations on a Full Depth Ocean Section in the South Atlantic Ocean. Goldschmidt Conference Davos Switzerland, June 2009.

Saito, M.A., E.M. Bertrand, V. Bulygin, D. Moran, J.B. Waterbury. Strategies for Economization of Cellular Iron in *Crocospaera watsonii* as Revealed by Global Quantitative Proteomic Analysis. Goldschmidt Conference, Davos, Switzerland, June 2009.

Noble, A.E., T. Goepfert, M.A. Saito. Cobalt Biogeochemistry in the South Atlantic: An Ocean Section of Total Dissolved Cobalt, and Prospects for a High Throughput ICP-MS Method. AGU December 2008. Poster Presentation.

Saito, M.A., E.M. Bertrand, V. Bulygin, D. Moran, J.B. Waterbury. Proteomic Analysis of the marine cyanobacterium *Synechococcus* WH8102 and implications for estimates of the cellular iron content. 2008 AGU Fall Meeting, San Francisco.

Saito, M.A., E.M. Bertrand, A. Anber. Neoproterozoic Oxygenation of Earth's Surface Environments Reflected in the Late Evolution of the O₂-Dependent Vitamin B₁₂ Biosynthesis Pathway. AGU Fall Meeting, San Francisco, 2008. Invited Speaker.

Saito, M.A., A.E. Noble, A.Cox, T.J. Goepfert. Trace Element Distributions and Phytoplankton Colimitations on a Full Depth Ocean Section in the South Atlantic Ocean. Goldschmidt Conference, Davos, Switzerland, June 2009. Keynote Talk.

Saito, M.A. The bioinorganic chemistry of the ancient ocean: the co-evolution of cyanobacterial metal requirements and biogeochemical cycles at the Archean-Proterozoic boundary? Goldschmidt Conference, Melbourne, Australia, August 2006. Invited Talk.

Saito, M.A., A.E. Noble, M.B. Westley, B.N. Popp. Evidence of Redox Cycling of Cobalt in the Costa Rica Dome and Central Pacific: Similarities to Nitrite and Nitrous Oxide Distributions. ASLO Meeting, Victoria Canada June 2006. Oral Presentation and Co-Session Chair.

John, S.G., B.A. Bergquist, M.A. Saito, E.A. Boyle. The Marine Biological Cycling of Zn Isotopes. ASLO Meeting, Victoria Canada June 2006. Oral Presentation.

Thompson, A.W., M.A. Saito, S.W. Chisholm. *Prochlorococcus* Iron Requirements and Whole Genome Response to Iron Starvation. ASLO Meeting, Victoria, Canada, June 2006. Oral Presentation.

Cox, A.D., A.E. Noble, M.A. Saito. Cadmium Stable Isotope Uptake by Phytoplankton, Speciation, and Toxicity Experiments in the Costa Rica Upwelling Dome. ASLO Meeting, Victoria, Canada, June 2006. Poster Presentation.

Bertrand, E.M., A.E. Noble, D.J. Repeta, E.A. Webb, M.A. Saito. Contrasting vitamin B₁₂ and cobalt uptake in phytoplankton populations in the Costa Rica Upwelling Dome. ASLO Meeting, Victoria, Canada, June 2006. Poster Presentation.

Goepfert, T.J., M.A. Saito. Cobalt substitution of the zinc requirement in *Phaeocystis antarctica* and thoughts on the concept of co-limitation. ASLO Meeting, Victoria, Canada, June 2006. Poster Presentation.

Noble, A.E., K. Maita, C. Benitez-Nelson, M.A. Saito. Cobalt, manganese, cadmium, and iron among the Hawaiian Islands: The influence of cyclonic eddies and hydrothermal signals. ASLO Meeting, Victoria, Canada, June 2006. Poster Presentation.

Saito, M.A. Cobalt, iron, and manganese biogeochemistry in the Equatorial Pacific and recovery experiments using the MgOH₂ precipitation ICP-MS method. American Chemical Society Geochemical Division. March 16, 2005. San Diego, Oral Presentation and Co-Session Chair.

Saito, M.A. Cobalt, iron, and manganese biogeochemistry in the Equatorial Pacific: Cobalt Scavenging in the Oxygen Minimum Zones. ASLO meeting February 2005. Oral Presentation and Co-Session Chair.

Saito, M.A., D.M. Sigman, F.M.M. Morel. The Bioinorganic Chemistry of the Ancient Ocean: The Co-Evolution of Cyanobacterial Metal Requirements and Biogeochemical Cycles at the Archean-Proterozoic Boundary? Environmental Bioinorganic Chemistry Gordon Conference. Maine, 2004.

Saito, M.A., Y. Xu, R. Wisniewski, J.W. Moffett. Cobalt Biogeochemistry in the North and Equatorial Pacific: Observations of Cobalt Limitation, and Cobalt Scavenging in Oxygen Minimum Zones. Environmental Bioinorganic Chemistry Gordon Conference. Maine, 2004.

Edgcomb, V.P., S.J. Molyneaux, M.A. Saito, K. Lloyd, S. Böer, C.O. Wirsen, M.S. Atkins, A. Teske. Sulfide Ameliorates Metal Toxicity for Deep-Sea Hydrothermal Vent Archaea. Environmental Bioinorganic Chemistry Gordon Conference. Maine, 2004.

Saito, M.A., Y. Xu, R. Wisniewski, R.J. Wallsgrove, J.W. Moffett, B.N. Popp. Iron and Cobalt Co-Limitation in the Central North Pacific and Bering Sea. ASLO-TOS, Hawaii, February 2004.

Castruita, M., M.A. Saito, P.C. Schottel, E.I. Stiefel, F.M.M. Morel. Cloning and Overexpression of an Iron Storage Protein in *Trichodesmium erythrae*. ASLO-TOS, February 2004, Hawaii.

Saito M.A., G. DiTullio, J.W. Moffett. Depletion of Cobalt as a Micronutrient in the Eastern Equatorial Pacific. Goldschmidt Conference, Kurashiki Japan. September 2003.

Castruita, M., M.A. Saito, P.C. Schottel, M.J. Grossman, M.K. Cody, F.M.M. Morel, E.I. Stiefel. Nature's Iron Controllers: Ferritin-Family Proteins in Bacteria. Departments of Chemistry and Geosciences, Princeton University, Princeton. ACS MARM (Middle Atlantic Regional Meeting), Princeton NJ, 2003.

Saito, M.A., T-Y Ho, F.M.M. Morel. Cadmium Toxicity to Marine Cadmium Toxicity to Marine *Synechococcus* at Picomolar Concentrations: Vestigial Interactions Indicative of Ancient Ocean Chemistry. ASLO Aquatic Sciences Meeting. Salt Lake City, Utah. 2003.

Saito, M.A., T.W. Lane, G. Taroncher-Oldenburg, F.M. M. Morel, B.B. Ward. A Search for Cobalt Proteins in *Synechococcus*: Overexpression of the Gamma Carbonic Anhydrase Enzyme and a Genome Wide Analysis of Cobalt Limited Cells. ASLO/AGU Ocean Sciences Meeting. Honolulu, Hawaii, USA 2002.

Saito, M.A., J.W. Moffett. Temporal and Spatial Variability of Cobalt in the Atlantic Ocean. AGU/ASLO Ocean Sciences Meeting. Honolulu, Hawaii. February 2002.

Saito, M.A.. The Coupling of the Biogeochemistry of Cobalt and the Bioinorganic Chemistry of Cobalt Carbonic Anhydrases. Gordon Conference on Environmental Bioinorganic Chemistry. June, 2002.

Edgcomb, V.P., S. Boer, S. Molyneaux, K. Lloyd, C. Wirsen, J. Erickson, M.A. Saito, M. Atkins, A. Teske. Hyperthermophiles of the Hydrothermal Vent Subsurfaces: Limits of Life and extraterrestrial analogs. 2nd Astrobiology Science Conference, NASA-Ames, 2002.

Edgcomb, V.P., S. Boer, S. Molyneaux, K. Lloyd, C. Wirsen, J. Erickson, M.A. Saito, M. Atkins, A. Teske. Hyperthermophiles of the hydrothermal vent subsurface: limits of life and extraterrestrial analogs (Poster Presentation). *Eos, Transactions, American Geophysical Union*, 83(4), Ocean Sciences Meet. Suppl., Abstract OS32B-130, 2002.

Castruita, M., I. E. Stiefel, F. M.M. Morel, M.A. Saito, G. Taroncher-Oldenberg Iron, Bacterioferritin, and the Marine Cyanobacterium *Synechococcus* WH8102. Presented at the 2002 Gordon Research Conference on Environmental Bioinorganic Chemistry, Andover, NH, June 2002.

Saito, M.A., F.M.M. Morel. Cobalt and Cadmium Carbonic Anhydrases in Marine Phytoplankton. American Chemical Society, Environmental Bioinorganic Chemistry Session. Orlando, 2002.

Saito, M.A., T-Y Ho, F.M.M. Morel. An unexpected turn in the trace metal trio story (Co,Cd, Zn): Cadmium toxicity to *Synechococcus* WH8102 at picomolar levels. Chemical Oceanography Gordon Conference, Oxford England, 2002.

Saito, M.A. Cobalt and Cadmium Carbonic Anhydrases in Marine Phytoplankton: Biogeochemical and Genomic Analyses. Gordon Conference on Environmental Bioinorganic Chemistry, June 2002.

Saito, M.A., J.W. Moffett. Cobalt Speciation in the Equatorial Pacific and Peru Upwelling Region: Sources and Chemical Properties of Natural Cobalt Ligands. American Society for Limnology and Oceanography, New Mexico, February 2001.

Saito, M.A., J.W. Moffett. Cobalt Speciation in the Equatorial Pacific and Peru Upwelling Region: Sources and Chemical Properties of Natural Cobalt Ligands. Gordon Conference New Hampshire, August, 2001.

Saito, M.A., F.M.M Morel. Metal Substitution in the Cyanobacteria. Center for Bioinorganic Chemistry Annual Meeting, Princeton, June, 2001.

Saito, M.A. The Influence of Cyanobacteria on the Marine Biogeochemistry of Cobalt. 2001 DIALOG ASLO Recent Dissertations.

Saito, M.A. The Biogeochemistry of Cobalt in the Sargasso Sea. 2000 DISCO Dissertations in Chemical Oceanography Conference, Honolulu, Hawaii October, 2000.

Saito, M.A., S.W. Chisholm, J.W. Moffett. Cobalt Uptake Mechanisms in *Prochlorococcus*: "Cobalophores" Versus the Free-Ion Model. American Society for Limnology and Oceanography, San Antonio, Texas, February, 2000.

Saito, M.A., J.W. Moffett, S.W. Chisholm. Are Cobalt Ligands Produced by *Prochlorococcus*? American Society for Limnology and Oceanography, Santa Fe, New Mexico, February, 1999.

Moffett, J.W., M.A. Saito. Organic Complexation of Cobalt in the Sargasso Sea. American Society for Limnology and Oceanography, Santa Fe, New Mexico, February, 1999.

Saito, M.A., M.R. Twiss. Total cobalt and copper concentrations in Lake Erie surface waters. Proceedings of the 41st Conference of the International Association for Great Lakes Research, 1998.

PAPERS PRESENTED AT MEETINGS AND INVITED LECTURES

ProSynFest Conference Spain, Postponed to 2022. *Invited Speaker*.

University of California Santa Cruz, October 8th, 2021. *Invited Virtual Lecture*.

Cellular Biology of Metals. Gordon Research Conference. October 2021. *Invited Lecture*.

Metaproteomics Conference, Luxemborg, September 2021. *Invited Speaker*.

Tara AtlantECO workshop. June 4th, 2021

ASLO Meeting, Invited Lecture ASLO Presentation "Why Environmental Nutrient Stress Biomarkers

Work: Protein-Transcript Correlations and Review of Biomarker Discoveries" June 2021 YouTube [video](#)

UN Ocean Shot presentation BioGeoSCAPES concept. February 2nd 2021. [Recording](#)

University of Southern California Department Seminar series November 17th 2020.

Ocean Protein Portal Lighting talk AGU EarthCube booth, December 4, 2020.

GEOTRACES GP15 Mini-Seminar November 5th, 2020. [Recording](#)

Oregon State University Center for Genome Research and Bioinformatics. October 14th, 2020. *Invited Virtual Lecture*. [Recording](#)

Tri-Service Microbiome Consortia. April 12-14th. *Invited Virtual Lecture*.

Marine Chemistry and Geochemistry Department Seminar March 2nd 2021.

Stockholm University Aquatic Microbial Ecology Lecture Series. *Invited Lecture* November 18, 2020. [Recording](#)

Marine Biogeochemistry. Gordon Research Conference. Hong Kong. June 2020. *Invited Speaker*
Cancelled due to COVID-19.

Scripps Institute of Oceanography, April 29th 2020. *Invited Virtual Lecture*.

Geobiology. Gordon Research Conference. Texas, January 2020. *Invited Lecture*.

Metals in Biology. Gordon Research Conference. California, January 2019, *Invited Lecture*.

ACS New Orleans. Alfred Bader Award in Bioinorganic or Bioorganic Chemistry: Symposium in honor of Alison Butler. March 17th, 2018. *Oral Presentation*

Presentation to Massachusetts Life Sciences at WHOI, November 28th 2017.

Thermo Power Users Meeting, ASMS Pre-Meeting Users Group. San Diego June 2018. *Invited Talk*.

ASMS Meeting San Diego. June 2018. *Poster*

Francois Morel Retirement Celebration Princeton University. June 11th 2018. *Poster*.

OCB Meeting WHOI 2018. *Poster*

Marine Microbes GRC Meeting Il Ciocco Italy. July 2018. *Poster*.

Annual Foundation Marine Microbial Investigators Meeting. July 23th 2018. *Oral Presentation*

ASLO Meeting. Portland Oregon. February 2018. *Oral Presentation*

Honolulu Aquarium, October 3rd, 2017. 5th year anniversary event for the R/V Falkor, Schmidt Ocean Institute. *Invited Interactive Data Display*.

WHOI Ocean Science Journalism Symposium, 2017. *Invited Speaker*.

International Conference on Biological Inorganic Chemistry (ICBIC-18), Florianopolis, Brazil July, 2017. *Keynote Speaker*.

Goldschmidt Geochemistry Meeting, Paris France. August 14, 2017. *Speaker*.

Chemical Oceanography Gordon Research Conference, July 26th 2017. *Poster*.

Annual Foundation Marine Microbial Investigators Meeting. July 19th 2017. *Speaker*.

American Society for Mass Spectrometry, June 7th 2017. *Poster*.

Presentations at Ocean Metaproteomics for Data Sharing Workshop. May3-5th, 2017. *Speaker*.

Royal Society of Chemistry Session on "Genomics, Proteomics and Other 'Omics" Pittcon, 2017. Chicago. *Invited speaker*.

ASLO Meeting, Honolulu Hawaii, February 27th, 2017. *Speaker*.

National Academy of Sciences Chemistry of Microbiome Seminar Series. December 7, 2016. Washington DC. *Panelist*.

National Academy of Sciences Chemistry of Microbiome-Oceans Seminar Series. October 19, 2016. Washington DC. *Invited Speaker*.

Naval Research Laboratory, October 18, 2016, Washington DC. *Invited Speaker*.

10th International Copper Meeting: Copper in Biology, Sorrento Italy. Sept 27, 2016. *Invited Speaker*.

Greater Boston Mass Spectrometry Discussion Group, November 17, 2015. *Invited Speaker Monthly Evening Lecture Series*.

University of California Santa Barbara, October 19, 2015, *Invited Speaker*.

Harvard University Microbial Science Initiative, September 10, 2015, *Invited Speaker*.

Cell Biology of Metals Gordon Research Conference. July 27, 2015. *Invited Speaker*.

Ocean Acidification Principal Investigators Meeting, Woods Hole June 11, 2015. *Invited Speaker*.

Bermuda Institute of Ocean Sciences January 28, 2015. *Invited Speaker*.

University of Dartmouth, March 10, 2015. *Invited Speaker*.

Sea Education Association. March 10, 2015. Lecture to Students on Antarctica.

ASLO Meeting, Session: The Molecular Ecology of Microbe-Metal Interactions in the Ocean Environment. Granada Spain, February 23, 2015. *Invited Speaker*.

Laboratoire des Sciences de l'Environnement Marin (LEMAR), Institut Universitaire Européen de la Mer, Technopôle Brest Iroise. November 20, 2014. *Department Seminar*.

Marine Biological Laboratory. November 14, 2014. *Invited Seminar*.

Congresso Brasileiro De Oceanografia (Brazilian Congress of Oceanography). Itajai, Santa Catarina, Brazil. October 2014. *Keynote Speaker*.

9th International Copper Meeting: Copper in Biology. Vico Equense, Italy. October 2014. *Invited Speaker*.

WHOI Ocean Science Journalism Symposium. September 9, 2014. *Invited Speaker*.

Biometals. Duke University. July 2014. *Invited Speaker*.

Ocean Global Change Biology Gordon Research Conference. Waterville Valley New Hampshire, July 6-11, 2014. *Invited Speaker*.

Saito, Mak, Matthew McIlvin, Dawn Moran, Tyler Goepfert, Giacomo DiTullio, Carl Lamborg. Multiple Nutrient Stresses at Intersecting Pacific Ocean Biomes Detected by Protein Biomarkers. American Society for Mass Spectrometry. Baltimore Maryland, June 14-19, 2014. *Poster*.

Environmental Geochemistry and Geophysics Seminar, Princeton University, March 27, 2014. *Invited Speaker*.

Saito, M.A., M. McIlvin, D.M. Moran, C.H. Lamborg, G. DiTullio. Intersection of nutrient limitation biomes in the Equatorial Pacific Ocean as detected by quantitation of proteomic biomarkers (Abstract ID: 16377). Ocean Sciences Meeting Hawaii, February 2014.

University of Rochester Biology Department. *Invited Lecture*, January 27th 2014.

University of Victoria, School of Earth and Ocean Sciences. *Invited Lecture*, January 21, 2014.

University of Santa Cruz, Department of Ocean Sciences. October 4, 2013. *Student-Selected Invited Speaker*.

WHOI Ocean Science Journalism Symposium. September 12, 2013. *Invited Speaker*.

"Distribution of Metalloenzymes in Pacific Ocean Environments as Detected by Proteomic Analysis" Goldschmidt Florence Italy August 27, 2013. *Keynote Speaker*

Evening Presentation for the Woods Hole Children's School of Science on Antarctica and Vitamins, July 2013.

"Distribution of nutrient stress biomarkers and metalloenzymes in the Pacific Ocean". Ocean Carbon and Biogeochemistry Summer Workshop. Woods Hole MA, July 23, 2013.

Saito, Mak, Matthew McIlvin, Dawn Moran, Tyler Goepfert, Alyson Santoro, Carl Lamborg, Vlad Zabrouskov, Justin Blethrow. Discovery and Quantitation of the Marine Microbial Metaproteome in the Central Pacific Ocean.; American Society of Mass Spectrometry. Minneapolis MN, June 12, 2013. *Poster*.

Microbial ecology and biogeochemistry of oxygen-deficient marine waters, 18-22 March 2013, Santa Cruz, Chile. *Invited Speaker*.

"Detection and Distribution of Metalloenzymes in Pacific Ocean Environments". ASLO Meeting, New Orleans. February 2013. *Oral Presentation*.

"Metalloproteins in the Ocean: Strategies for Coping with Extreme Metal Scarcity". Metals in Biology Gordon Research Conference. Ventura California January 2013. *Invited Speaker*.

"Metalloenzymes from Marine Microbes of the Pacific Ocean Oxygen Minimum Zones". 8th International Copper Meeting: Copper in Biology. Sardinia Italy. October 4, 2012. *Invited Speaker*.

WHOI Ocean Science Journalism Symposium Invited Speaker. September 13, 2012.

"Proteomic Investigations of Key Biogeochemical Marine Metalloenzymes". Marine Microbes Gordon Research Conference, June 25, 2012. Il Ciocco Tuscany Italy. *Invited Speaker*.

American Chemical Society San Diego CA. March 29, 2012. *Invited Speaker*.

Forsythe Institute, Boston MA, January 31, 2012. *Invited Speaker*.

Chemical Oceanography Gordon Research Conference, August 16, 2011, *Invited Speaker*.

Ocean Carbon and Biology Global Biogeochemical Flux – Ocean Observing Initiative Scoping Workshop
 May 2011, *Invited Speaker*.

Polar Marine Science Gordon Research Conference, March 2011. *Invited speaker*.

Upper-Ocean Nutrient Limitation IGBP workshop, Southampton UK. November 2010, *Invited Speaker*.

Biogeochemicals Workshop Los Angeles, November 2010, *Invited Speaker*.

Society for General Microbiology, Metals and Microbes Session, Nottingham UK. September 8, 2010.
Invited speaker.

EU COST Speciation Database Workshop, Kiel Germany, August 2010, *Invited speaker*.

Organic Geochemistry Gordon Conference, August 3, 2010. *Invited speaker*.

Environmental Bioinorganic Chemistry Gordon Conference, June 2010. *Invited speaker*.
 Caltech, May 5, 2010. *Invited speaker*.

Massachusetts Institute of Technology, EAPS March 5, 2010, *Invited speaker*.

Goldschmidt Conference, Davos Switzerland June 2009, *Keynote Lecture*.

U. Mass Boston, April 29, 2009. *Invited speaker*.

Stanford University February 2009. *Invited speaker*.

Marine Chemistry and Geochemistry Department Lecture WHOI, February 2009.

AGU Fall Meeting, San Francisco, December 2008. *Invited Speaker*.

Rutgers University, October 6, 2008. *Invited speaker*.

GEOTRACES Pacific Cruise Planning Meeting, U. Southern California October 1-3 2008, *Plenary Speaker*.

Environmental Bioinorganic Chemistry Gordon Conference June 2008, *Invited Speaker*.

Medical University of South Carolina, Student Open House, June 2008, *Keynote Speaker*.

Environmental Bioinorganic Chemistry Gordon Conference, June 2008, *Invited Speaker*.

Stanford University, Oceans Seminar, May 2008. *Invited Speaker*.

WHOI Summer Student Fellow Lecture Series. July 2008.

Children's School of Science. Presentation to Global Sustainability and Experiments Class. July 2008.

GEOTRACES, Atlantic Basin Planning Meeting. September 2007, Oxford University. *Invited Speaker*.

Ocean Carbon Biogeochemistry Workshop, July 2007. *Invited Speaker*.

University of Kyoto, June 2007. *Invited Speaker*.

Stonybrook University, May 2006. *Invited Speaker*.

Harvard University, October 2006. Microbial Science Initiative *Invited Speaker*.

U. Rhode Island. September 2006. *Invited Speaker*.

Oregon Graduate Institute. September 2006. *Invited Speaker*.

Old Dominion University. September 2006. *Invited Speaker*.

Goldschmidt August 2006. *Invited Speaker*.

ASLO June 2006. Oral Presentation and Co-Session Chair.

American Chemical Society Meeting, March 16, 2005. Oral Presentation and Co-Session Chair

ASLO February 2005. Oral Presentation and Co-Session Chair.

Earth Atmospheric Planetary Sciences Department, MIT. December 3, 2004. *Invited Speaker*.

Summer Lecture Series. Woods Hole Oceanographic Institution. July 8, 2004.

American Society for Limnology and Oceanography –TOS meeting, February 2004, Hawaii. Presentation

Goldschmidt Conference, Kurashiki Japan. September 2003. Oral Presentation.

McGill University, November 12, 2003. *Invited Speaker*.

Stanford University, Geosciences Department. October 23, 2003. *Invited Speaker*.

University of South Carolina, Columbia. April 2003. *Invited Speaker*.

Gordon Research Conference on Environmental Bioinorganic Chemistry. June 18, 2002. *Invited Speaker*.

Gordon Research Conference on Environmental Bioinorganic Chemistry, Andover, NH, June 16-21, 2002.
 Poster

AGU/ASLO Ocean Sciences Meeting. Honolulu, Hawaii. February 2002. Oral Presentation.

Environmental Geochemistry and Geophysics Seminar. Princeton University. 2002
American Chemical Society, Environmental Bioinorganic Chemistry Session. Orlando, 2002. *Invited Speaker.*

Chemical Oceanography Gordon Conference, Oxford England. 2002. Poster.

Princeton Bioinorganic Chemistry Supergroup, Department of Chemistry. December 4, 2002.
Wesleyan University. February 2002. *Invited Speaker.*

Marine Chemistry and Geochemistry Department Seminar. April 3, 2002. *Invited Speaker.*

American Chemical Society, Environmental Bioinorganic Chemistry Session. Orlando, 2002. *Invited Speaker.*

American Society for Limnology and Oceanography. February 2001 New Mexico. Oral Presentation.

American Society for Limnology and Oceanography. February 13, 2001 New Mexico.

Center for Bioinorganic Chemistry Annual Meeting, Princeton. June 20, 2001. *Invited Speaker.*

College of Marine Studies Seminar Series, University of Delaware in Lewes. November 6, 2001. *Invited Speaker.*

2001 DIALOG ASLO Recent Dissertations Conference, BBSR, Bermuda.

Woods Hole Oceanographic Institution. Summer Student Lecture Series. June 23, 2000.

Marine Chemistry and Geochemistry Seminar, Woods Hole Oceanographic Institution. June 12, 2000.

Dissertations in Chemical Oceanography Conference. October 24, 2000. Honolulu, Hawaii.

American Society for Limnology and Oceanography. 2000. San Antonio, Texas. Oral Presentation.

Office of Naval Research History of Oceanography Conference. WHOI. March 2000. Poster.

American Society for Limnology and Oceanography. February 3, 1999. Santa Fe, New Mexico. Oral Presentation.

American Society for Limnology and Oceanography. February 4, 1999. Santa Fe, New Mexico. Oral Presentation.

Aquatic Sciences Seminar. Civil and Environmental Engineering MIT. November 1999.

MIT Environmental Biology Seminar. April 30, 1999. *Invited Speaker.*